# PATENT COOPERATION TREATY



From the:
INTERNATIONAL SEARCHING AUTHORITY

To:

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# PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)* 04 MAY 2005

Applicant's or agent's file reference
20500250SJ

**FOR FURTHER ACTION**
See paragraph 2 below

| International application No. | International filing date *(day/month/year)* | Priority date *(day/month/year)* |
|---|---|---|
| **PCT/SG2005/000043** | 17 February 2005 | 17 February 2004 |

International Patent Classification (IPC) or both national classification and IPC
**Int. Cl.** [7] H01L 27/146, G01J 3/46

Applicant
NANYANG TECHNOLOGICAL UNIVERSITY et al

1. This opinion contains indications relating to the following items:

- [X] Box No. I — Basis of the opinion
- [ ] Box No. II — Priority
- [ ] Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV — Lack of unity of invention
- [X] Box No. V — Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI — Certain documents cited
- [ ] Box No. VII — Certain defects in the international application
- [X] Box No. VIII — Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY**

International application No.
**PCT/SG2005/000043**

**Box No. I Basis of the opinion**

1. With regard to the **language,** this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material

      ☐ a sequence listing
      ☐ table(s) related to the sequence listing

   b. format of material

      ☐ in written format
      ☐ in computer readable form

   c. time of filing/furnishing

      ☐ contained in the international application as filed.
      ☐ filed together with the international application in computer readable form.
      ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE
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PCT/SG2005/000043

**Box No. V** **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Claims | **5,8,9, 13-18,23,29-31,36-38** | **YES** |
| | Claims | 1-4,6,7,10-12,19-22,24-28,32-35,39-41 | **NO** |
| Inventive step (IS) | Claims | **8,9,13-18,23,29-31** | **YES** |
| | Claims | 1-7,10-12,19-22,24-28,32-41 | **NO** |
| Industrial applicability (IA) | Claims | **1-41** | **YES** |
| | Claims | | **NO** |

2. Citations and explanations:

**Novelty and Inventive Step**

EP 1 006 585 discloses a three colour detection pixel sensor comprising a top doped p+ layer contacted by an N-well beneath, and P-substrate beneath that in turn. Electrical gate contacts ie doped regions on the top surface contact both sides of the p+ region and the N-well and P- substrate in turn to allow current to flow when each layer detects a certain colour wavelength. Therefore claims 1,3,4,6,19,22,27,28,32-35,39-41 cannot be said to be novel or to have an inventive step.
Col 5 line 4-8 describes the implant and anneal depth as being controlled experimentally to set the wavelength desired to be detected. Therefore claims 2 and 20 cannot be said to have an inventive step.
Claims 36-38 define the manner in which the current is determined using standard subtraction when not illuminated. This is well known in the art and cannot be said to contribute any inventive step.
The placement of electrical contacts one side or the other would be a matter of application and design. Therefore claim 5 cannot be said to contribute any inventive step.

US 5 965 875 discloses a three colour sensor with three stacked n-p-n- levels with a possible fourth doped p region below again. Electrical contacts are placed in contact with the regions to determine current flowing due to impinging light. See col 5 line 1-30 for specific doping concentrations and depths of junctions. Therefore claims 1-4,6,7,10-12,19-22,24-28,32-35 **cannot be said to be novel or to have an inventive step.**
The arguments concerning claims 5 and 36-38 as taken above also apply here.

SU 1689768 discloses a three pn junction colorimetric sensor one above another which use photocurrents induced by a particular wavelength in each level. Claims 1,3,4,6,10-12,19,32-35,39-41 cannot be said to be novel or to have an inventive step. The arguments concerning claims 5 and 36-38 as taken above also apply here.

JP 07-038136 discloses a photodetective element composed of pn junctions different to each other in wavelength selectivity to induce a current proportional to the light detected. Therefore claims 1,3,4,6,10-12,19,32-35,39-41 cannot be said to be novel or to have an inventive step. The arguments concerning claims 5 and 36-38 as taken above also apply here.

**WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY**

International application No.

**PCT/SG2005/000043**

**Box No. VIII Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 32 does not fully define the invention described. It would appear essential from the specification as a whole that two depleted regions should be defined beneath the light transmitting surface of the JFET which allow a current to be induced upon illumination by a wavelength .specific to the three regions. See paras 007 and 008 for the descriptive concept of the invention and the object of the invention.